Policy Research

WORKING PAPERS

Socioeconomic Data

International Economics Department
The World Bank
August 1992
WPS 953

The "Pedigree" of IEC Conversion Factors for Per Capita GNP Computations for the World Bank's Operational Guidelines and *Atlas*

Michael Hee

Overview of sources, methods, adjustments, and manipulations of alternative conversion factors for the Bank's *Atlas* per capita income calculations.

Policy Research

WORKING PAPERS

Socioeconomic Data

WPS 953

This paper — a product of the Socioeconomic Data Division, International Economics Department — is part of a larger effort in the department to systematize the use of official and other exchange rates for calculating per capita income. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Estela Zamora, room S7-136, extension 33706 (August 1992, 47 pages, including appendix tables).

Per capita GNP — calculated according to the Bank's *Atlas* method — is the Bank's main criterion for classifying countries to determine their eligibility for various beneficial borrowing terms. It is also a broad criterion for distinguishing countries by income group (low, middle, lower-middle, upper-middle, and high).

In principle, the Bank adopts the official annual average exchange rate (line *rf* in the Fund's *International Financial Statistics*) as the preferred source for exchange rates for calculating per capita GNP. But where this rate is clearly inappropriate — when the calendar year rate does not coincide with the fiscal year national accounts data, for example, when countries' maintain dual or multiple exchange practices, or when distortions in the trade and payments system make the official rate an unreliable link between relative prices of traded goods — the Bank's International Economics Department (IEC) uses an alternative exchange rate (conversion factor).

Hee briefly explains how these alternative exchange rates are calculated, the rationale behind them, and the footnoting features of the Bank's Economic and Social Database that make these calculations more transparent to users of the data.

He finds that the single most often used source is the official annual average exchange rate — for about 85 percent of the cases in 1990. Fiscal year conversion factors are used in about 10 percent of cases.

Technically, fiscal year conversion factors are official quarterly exchange rates recast to the fiscal year timeframe. Thus, official exchange rates shown in the *International Financial Statistics* account for 95 percent of the countries for which IEC prepares comparable per capita estimates. As trade and exchange systems become more liberal, and as multiple exchange systems have been unified in recent years, fewer and fewer official exchange rates have diverged significantly from the rate at which transactions take place.

Hee's analysis underscores the direct implications for Bank operations and analysis of a systematic and documented approach to the choice of conversion factors that underpin the Bank's *Atlas* per capita income estimates — which can affect eligibility for borrowing and country ranking by income group.

The use of alternative conversion factors is thus of some practical importance, both to the Bank and to other international organizations considering the use of Bank classifications in allocating concessional assistance.

"PEDIGREE" of IEC CONVERSION FACTORS

for PER CAPITA GNP COMPUTATIONS

for the BANK'S OPERATIONAL GUIDELINES and ATLAS

Prepared by:
Michael Hee, IECSE

"PEDIGREE" of IEC CONVERSION FACTORS for PER CAPITA GNP COMPUTATIONS for the BANK'S OPERATIONAL GUIDELINES and ATLAS **

TABLE OF CONTENTS

** The author is grateful to Vikram Nehru whose valuable comments and suggestions make this a more useful and cogent product.

SUMMARY and CONCLUSIONS

Per capita GNP, calculated according to the Bank's Atlas methodology, constitutes the Bank's main criterion for classifying countries to determine eligibility for various beneficial borrowing terms, and also as a broad criterion for distinguishing countries by income (low, middle, lower-middle, upper-middle, and high) groups.

The analysis in this paper underscores the operational and practical implications of a systematic and well documented approach to the choice and sources of conversion factors that underpins the Bank's Atlas methodology for per capita income estimates.

In principle, the Bank adopts the official annual average exchange rate (line rf in the Fund's International Financial Statistics (IFS) as the preferred source for exchange rates for the per capita GNP calculations. However, where this rate is clearly inappropriate, such as when the calendar-year rate does not coincide with the fiscal-year national accounts data, or when distortions in the trade and payments system make the official rate an unreliable linkage between relative prices of traded goods, IEC uses an alternative exchange rate (conversion factor).

This paper briefly explains how these alternative exchange rates are calculated, the rationale behind them, and the footnoting features in the Bank's Economic and Social Database (BESD) that make these calculations more transparent to users of the data.

The analysis reveals that the single most frequently used source is the official annual average exchange rate -- about 85 percent in 1990 (see Table 1). Fiscal-year (FY) conversion factors account for about 10 percent. Technically, FY conversion factors are official quarterly exchange rates recast to the FY timeframe. Thus, official exchange rates shown in the IFS account for 95 percent of the countries for which IEC estimates comparable per capita estimates. Table 1 in the paper also reveals that, as trade and exchange systems have become more liberalized, and as multiple exchange systems have been unified in recent years, fewer and fewer countries' official exchange rates have diverged significantly from the rate at which transactions take place.

From the Bank's own operational and analytical perspective, there is no direct operational implication, in 1990, for FY countries when annual average exchange rates are substituted in the calculations (see Table 3). Their borrowing eligibility for various Bank lending programs as well as country ranking by income group remain unchanged.

However, several interesting insights are revealed in Table 4. If trade-weighted conversion factors are substituted by annual average exchange rates, several countries in 1990 (e.g., Egypt, Honduras, Iran, Peru, and Syria) lose eligibility for "softer-term" Bank lending (see Table 4). Similarly, the change in relative country rankings for Argentina and Bolivia would have affected their lending terms (Table 5). This is because these countries move to a corresponding higher income group. The use of alternative conversion factors is thus of some practical importance, both to the Bank and to other international organizations considering the use of Bank classifications in the allocation of concessional assistance. countries. There is widespread feeling that some of these organizations granting preferences may take seriously Bank classifications into account.

"PEDIGREE" of IEC CONVERSION FACTORS for PER CAPITA GNP COMPUTATIONS for the BANK'S OPERATIONAL GUIDELINES and ATLAS

I. Introduction

A. GNP per Capita and Country Classifications

The Bank uses a variety of country classifications for its operational, analytical, and statistical purposes. In the operational context (known as Operational Guidelines within the Bank), the Bank has established thresholds of per capita GNP categories, based on the **Atlas** methodology,[1] to classify member countries into groups eligible for various Bank procurement practices, and for loans and credits on different terms (e.g., civil works preferences, IDA credits, IBRD loans, and graduation). Likewise, the classifications used for analytical and statistical purposes, which cover both member and non-member economies, are best represented in the Bank's publications **World Development Report**, **World Development Indicators**, and **The World Bank Atlas**. Per capita GNP estimates are used by the Bank as the main criterion for grouping countries into low-income, lower-middle income, upper-middle income, and high-income classifications.

[1] A brief description of the **Atlas** methodology for computing GNP per capita is found in the technical notes to the **World Development Indicators** (Washington, DC: The World Bank); various issues.

Given the significant operational and analytical/statistical role in the Bank of internationally comparable measures of GNP per capita, a systematic and well documented approach [2] to exchange rates (or conversion factors) underpins the Bank's **Atlas** methodology. Recent improvements in the International Economics Department's (IEC) procedures for documenting the "pedigree" of exchange rates (and other macroeconomic data in the Bank's central database, BESD (Bank Economic and Social Database)) provide a new means of disseminating information on improved and more transparent documentation of methods, sources and details of alternative ("special") exchange rates.

B. Scope of Paper

This paper presents an overview of the "pedigree" (that is, the history and origin of sources, methods, and adjustments and manipulations, if any) of IEC conversion factors that are used to calculate per capita GNP according to the **Atlas** methodology for the Bank's operational and analytical/statistical purposes.

In principle, the Bank adopts the unweighted annual average of the official exchange rate (shown as line **rf** in the Fund's **International Financial Statistics (IFS)**) as the authoritative and preferred source for exchange rates for the per capita GNP

---

[2] A review of the methodological issues, including choosing appropriate conversion factors, relevant to the calculation of per capita GNP for the Bank's Operational Guidelines is found in **Per Capita Income -- Estimating Internationally Comparable Numbers** (International Economics Department, World Bank, January 13, 1989).

calculations according to the Atlas methodology. Where the IFS annual average exchange rate (hereafter referred to as IFS.RF) is clearly inappropriate, such as when calendar-year IFS.RF do not coincide with the fiscal-year national accounts data, or when distortions in the trade and payments systems make the IFS.RF an unreliable linkage between domestic prices and international prices, IEC uses alternative conversion factors for converting and presenting the national accounts aggregates into US Dollars.

The paper discusses how IEC estimates alternative conversion factors for the per capita GNP calculations when the IFS.RF is inappropriate as a guide to the relative prices of traded goods.

The last part of the paper discusses footnoting features in BESD that make these calculations of per capita estimates more transparent to the user of these data. Country-specific details are given in Annexes I to III on sources of exchange rates of all countries for which IEC calculates alternative conversion factors.

C. "Pedigree Notes in BESD

Systematizing the use of official and other exchange rates in IEC for per capita GNP calculations in the form of footnoting features in BESD serve to make data sources, methods, adjustments and manipulations more transparent to users of these data in the Bank.

Four types of pedigree notes are used for IEC conversion factors. The simplest explain that the exchange rates are indeed entirely from the IFS.RF; the second type denotes that the exchange rates are from the IFS but that IEC shifts the annual average exchange rates to a fiscal year basis to conform with the time-frame of the national accounts.[3] Pedigree notes are more complex where dual or multiple exchange rate practices prevail because they must at least explain the weighting process used to compute composite conversion factors from separate IFS rates, and identify additional official rates included in IEC composite conversion factors. Finally, pedigree notes explain how substitute or alternative conversion factors are computed.

In summary, the objectives of this "pedigree" exercise are:

(a) identify the sources of the exchange rates IEC uses for the Atlas-based per capita GNP calculations (see Annex I);

(b) identify countries where the exchange rates used are <u>not</u> IFS.RF annual average rates (Annex I);

(c) document sources and other relevant details (method, time-frame, manipulations) for countries identified in (b) above;

(d) footnoting features in the mainframe BESD to make per capita GNP calculations more transparent to users of these

---

[3] A similar IEC recompilation of balance of payments data to accord with fiscal year national accounts occurs where quarterly balance of payments figures are available.

II. Incidence of Conversion Factors for the Atlas

A. IFS.RF Annual Average Exchange Rates

Much of IEC's analytical work on development in member countries and on the efficacy of policies requires inter-country, inter-regional, and inter-income groups comparisons which require, at some stage, the conversion of major economic aggregates (for example, national accounts, balance of payments, trade flows, fiscal accounts) expressed in national currencies into a common numeraire. Market rates, however, vary from day to day. The various types of data series that need to be converted to a common currency are compiled over a period -- usually quarter or year. Thus longer period data are the sums of the compilation period. It follows that the use of prevailing market rate conversion requires the use of averages.

IFS reports official exchange rates, both end-of-period and period averages (of daily or monthly rates, not weighted by trade values) against the US dollar and the SDR; and, for countries with multiple currency practices, for up to three rates. The Fund defines the IFS.RF annual average exchange rates as:

> "par rate/market conversion factors for trade and other flow or average statistics, ... that they are period average market rates wherever available, i.e., period average rates in the market of the country, or if these are not available, official rates.... Period averages for market rates and for any official rates are made from averages of daily data (arithmetic averages of market rates),..... and all trade figures in IFS are converted from national currency values to U.S. dollars and from U.S. dollars to national currency with series rf."
>
> IMF, International Financial Statistics, Introduction

Thus the **IFS.RF** annual average exchange rate should be viewed as a general purpose conversion factor that can be appropriately applied to major economic aggregates. As stated earlier, IEC accepts the **IFS.RF** annual average exchange rates that relate national currencies to the US dollar as the preferred exchange rates for calculating per capita GNP estimates for the Bank's operational or lending guidelines, and for statistical purposes except in those instances where the **IFS.RF** annual average exchange rate is clearly inappropriate.

The incidence of the types of conversion factors IEC uses for calculating the **Atlas** -based per capita GNP estimates is presented in Table 1 below. The single most frequently used source -- about 85 percent of countries for which IEC estimates comparable measures of GNP per capita -- is the **IFS.RF**.

Table 1: Incidence of Source and Type of Conversion Factors Used in Atlas -based GNP per Capita Calculations

	Percent Distribution						
Type of Exchange Rate	1960	1965	1970	1975	1980	1985	1990
1.IFS.RF ann.av.exchange rate	91	91	91	88	87	83	85
2.Non-IFS exchange rate of which:							
(a) FY exchange rate /1	9	9	9	9	9	9	8
(b) Trade-weighted /2	-	-	-	1	1	6	6
(c) Relative price adjusted/3	-	-	-	2	3	2	-
Total	100	100	100	100	100	100	100

Source: BESD/AHDREX

/1 See Annex I.A for country listing.
/2 See Annex I.B for country listing.
/3 See Annex I.C for country listing. As trade and exchange systems have been liberalized, and multiple exchange systems have been unified in recent years, fewer and fewer countries' official exchange rates have differed "egregiously" from the transaction rate.

B. Non-IFS Annual Average Exchange Rates

Table 1 reveals that the exchange rates used in the per capita GNP calculations for 40 countries (about 20 percent) are not the IFS.RF annual average exchange rates. These conversion factors can be sub-categorized into (a) fiscal-year (FY) conversion factors, (b) trade-weighted composite conversion factors, and (c) conversion factors that have been adjusted for relative price movements.

C. Constructing Fiscal-Year (FY) Conversion Factors

Annex I.A lists those countries where the conversion factors used by IEC in calculating per capita GNP estimates are on a FY basis and, therefore, are exceptions to the **IFS.RF** annual average exchange rates. It should be noted, however, that the source of these FY exchange rates is still the **IFS.RF**. IEC shifts the annual average exchange rates to a FY basis to conform with the FY time-frame of the national accounts. The FY exchange rate is simply the unweighted average of the **IFS.RF** quarterly average exchange rates; technically, therefore, these countries can be classified as using the authoritative **IFS** source of exchange rates for the GNP per capita calculations to classify countries for the Bank's operational, analytical, and statistical purposes.

To illustrate, India's national accounts and other principal macroeconomic aggregates (BoP, trade flows, industrial production, fiscal accounts) are compiled on a FY basis, beginning April 1 and ending March 31 the following year. Effectively, the FY exchange

rate for the Atlas per capita GNP calculations is the simple average of the IFS quarterly exchange rates for the second, third, and fourth quarters (April-December) of the previous year and the first quarter (January-March) of the current year.

Table 2 shows the incidence of the time-frame of the national accounts of the countries shown in Annex I.A. The table reveals that most (80 percent) FY periods of countries for which IEC maintains national accounts fall into the following two categories:

(a) FY beginning July 1, ending June 30;

(b) FY beginning April 1, ending March 31.

Table 2: Incidence of FY National Accounts Time Frames

Fiscal Year Beginning	Ending	No. Countries	Incidence %
July 1	June 30	9	56
April 1	March 31	4	25
October 1	September 30	1	6
July 16	July 15	1	6
March 21	March 20	1	6
	Total	16	100

Source: IECSE

It is clear that the robustness of per capita income computations demands, among others, data covering the same time-frame. It would be interesting, however, to see how the categorization of borrowing countries' eligibility for various Bank lending programs, as well as the country ranking by income groups, would change if the IFS.RF annual average exchange rates were used.

Table 3 below reveals that for the developing countries with FY national accounts data, the use of IFS.RF annual average exchange rates, instead of the FY exchange rates, did not result in movements from one lending category to another in terms of the Bank's lending operations, or from one income group to another in terms of country classification for analytical and statistical purposes.

Table 3: Fiscal-Year and IFS.RF Exchange Rates in Per Capita Calculations: Change in Country Classification

Country	1990 GNP per Capita (US$)			Change in Country Classification	
	FY Rate /1	IFS.RF	% Change	Operational	Statistical/Analytical
Bangladesh	210	210	-	No change	No change
Botswana	2,040	1,940	4.9	No change	No change
Cameroon	960	980	2.1	No change	No change
Gambia	260	270	3.8	No change	No change
Haiti	370	370	-	No change	No change
India	350	350	5.7	No change	No change
Nepal	170	170	-	No change	No change
Nigeria	290	270	6.9	No change	No change
Pakistan	380	380	-	No change	No change
Sierra Leone	250	240	4.0	No change	No change
Tonga	1,010	1,020	1.0	No change	No change

Source: BESD

/1 World Development Report 1992

The Fund's IFS for the countries shown in Table 3 reveals that the fluctuation of exchange rates during the period 1988-90 (base period for the 1990 Atlas per capita GNP calculations) was moderate and did not result in significantly large deviations between the FY and the annual average rates.

D. Estimating Trade-Weighted Conversion Factors

Annex I.B presents the list of countries where estimated trade-weighted composite averages of officially recognized exchange rates [4] for the periods specified are used in for the Atlas per capita GNP calculations. Country-specific notes on sources, methodology, and the matrix of multiple rates and corresponding weights for each of those countries with trade-weighted composite conversion factors are presented in Annex II.

The existence of multiple exchange rates in the trade and payments system provides indications that the use of the official exchange rate in the per capita GNP calculations is not appropriate. The larger the deviations in the multiple rates relative to the official exchange rate, the stronger the need for a careful and systematic review of the various rates, given their impact on GNP per capita estimates. The focus on multiple rates should be determined on the basis of the magnitude of the premium

---

[4] While recognizing the importance of parallel or black market rates in many developing countries IEC, however, is mindful of the risks of using statistics pertaining to what are in many countries illegal activities.

as well as the size of the market, i.e., the larger the share of trade conducted at the non-official exchange rates, the greater the need for estimating an alternative conversion factor.[5]

Adjustments to the official and multiple rates require intimate knowledge of the applications of respective rates to specific transactions. It should be emphasized that a definitive assessment would require information beyond the level of details available in existing data.

Trade-weighted composite conversion factors are therefore estimated as:

$$E_t = [\ (R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + ... + (R_{n,t} * W_{n,t})\ ]$$

where:

E = trade-weighted composite conversion factor,
R_i = multiple rates, 1, 2, 3, ... n,
W_i = corresponding trade weights, 1, 2, 3, ... n.
t = year

It would be interesting to see if member countries' rankings within the Bank's eligibility classification for various loan programs or income groupings change if trade-weighted conversion factors are substituted by the **IFS.RF** annual average exchange rates.

---

[5] See, Michael Hee, **Conversion Factors: A Discussion of Alternative Rates and Corresponding Weights**, PRE Working Paper Series, WPS 479 (World Bank, August 1990).

Table 4 below sets out the comparative 1990 per capita income estimates resulting from the use of trade-weighted conversion factors and IFS.RF annual average exchange rates for countries where trade-weighted conversion factors are applicable for the 1990 Atlas per capita GNP.

Table 4: Trade-Weighted and IFS.RF Exchange Rates in Per Capita Calculations: Change in Country Classification

	1990 GNP per Capita (US$)			Change in Country Classification	
Country	Trade-Weighted Conversion Factor	IFS.RF	% Change	Operational /2	Analytical/Statistical
Egypt	600	1,200	100.0	I to II	Low-income to Lower-middle
El Salvador	1,110	1,190	7.2	No change	No change
Honduras	590	690	16.9	I to II	Low-income to Lower-middle
Iran	2,490	8,350	235.3	III to Graduation	Upper-middle to High-income
Paraguay	1,110	1,280	15.3	II to III	No change
Peru	1,160	1,580	36.2	II to III	No change
Suriname	3,050	3,170	3.9	No change	No change
Syria	1,000	1,660	66.0	II to III	No change
Uganda	220	310	40.9	No change	No change
Zambia	420	440	4.8	No change	No change

Source: BESD

/1 World Development Report 1992
/2 Operational Lending Categories:
- I Civil Works Preference
- II IDA Eligibility and 20-Year IBRD Terms
- III 17-Year IBRD Terms
- IV IBRD Graduation

For several countries (e.g.,Egypt, Honduras, Iran, Peru, and Syria) there are substantial differentials in the GNP per capita estimates. Had IFS.RF annual average exchanges rates been used in the per capita calculations, these countries would have moved to a correspondingly higher income group classification and lost eligibility for "softer term" Bank lending. This is of some practical importance, both to the Bank and to other international

organizations considering the use of Bank classifications in the allocation of concessional assistance.

Data presented in a Policy and Research Working Paper Series (WPS 479) [6] indicate that for almost half of those countries for the IFS documents multiple rates, these multiple rates exceed the official rate 30 percent or more. Although the spread between multiple rates and the official rate has narrowed for most countries, it has remained consistently high in Egypt, Iran, Peru, and Syria (See Annex II).

E. Estimating Relative Price-Adjusted Conversion Factors

Annex I.C lists the countries where IEC's systematic examination of the evolution of the effective exchange rates has indicated that the relationship between the domestic and foreign prices is so out of line as to distort the evolution of real exchange rates over time. In such circumstances, the annual average official exchange rate is clearly inappropriate for per capita GNP calculations. While an effective transaction rate may be difficult to measure accurately, it may be approximated with adequate data on tariffs, subsidies, surcharges and exchange controls. Where such relevant data are not available or inadequate to form an estimate, IEC estimates alternative conversion factors by adjusting the

---

[6] See Michael Hee, Conversion Factors: A Discussion of Alternate Rates and Corresponding Weights, PRE Working Paper WPS 479 (World Bank, August 1990), Table 3, p.17.

IFS.RF annual average exchange rate of a recent past year for changes in prices (relative to that of the US) during the period.

A recent year is identified where "normal" conditions were thought to prevail (Argentina - 1982; Bolivia - 1973; Ghana - 1972; and Guinea-Bissau - 1976) and the **IFS.RF** annual average exchange rate for that year is used as a base. The exchange rate for all other years is then adjusted for changes in the **Domestic Absorption Deflator**, relative to that of the US. The rationale for this methodology is based on the purchasing power parity (PPP) theory of exchange rates which argues that the foreign exchange value of a national currency is largely determined by the purchasing power of that currency relative to the purchasing power of foreign currencies. [7] Thus according to the PPP theory, relative inflation movements need to be offset by exchange rate changes. Also, PPPs become all the more relevant and applicable if trade restrictions and exchange controls are so high as to significantly distort the official exchange rate.

For some countries that have severe inflation but stick official exchange rates, as in some Latin American countries such as Argentina and Bolivia, the differential in domestic and foreign inflation is not offset by a corresponding exchange rate

---

[7] A comprehensive discussion of various aspects of the purchasing power parity doctrine is given in Lawrence H. Officer, **Purchasing Power Parity and Exchange Rates** (Greenwich, Connecticut: Jai Press, 1982); see also Alan C. Shapiro, "What Does Purchasing Power Parity Mean?" **Journal of Money and Finance**, Vol.2, No. 3, December 1983, pp. 295-318.

depreciation. The persistent large gap between the rate of depreciation of the local currency and the inflation differential suggests the need for a conversion factor for per capita GNP calculations other than the official exchange rate.

Usually, under such circumstances, the alternative conversion factor is estimated as follows:

$$E_t = E_o * (P_{d,t}/P_{f,t})$$

where:

E_t = the exchange rate expressed as the number domestic currency per unit of foreign currency at time t;

E_o = actual or "market" or current exchange rate in base year "o" which is not necessary equal to the "equilibrium" rate defined in any manner.

$P_{d,t}$ = domestic price index at time t;

$P_{f,t}$ = foreign price index at time t;

There are some limitations to this approach. For example, there are judgments involved in the choice of a "normal" year as it is difficult to assess the impact of existing trade restrictions that are not well documented.

In addition, the individual prices used to construct the domestic and foreign price indices must be undistorted and comparable. This is hard to do in a multicommodity world with

relative price changes, differing consumption preferences across countries, nontraded goods, transportation costs, and trade barriers.

Suggestions on which price index to use include the price of the least traded commodity -- labor -- to an index for nontraded goods only, an index for traded goods only, and the broadest domestic index available -- GNP deflator.[8] Comparison of unit labor costs is beset with measurement problems. Among these are measurements reflecting differences in type, quality, and productivity of labor. Price indices based on internationally traded goods (export and import price indices) are limited to a small class of commodities, relative to all goods and services, and are therefore subject to variations that presumably would not be present in a broad-based price measure. Also, traded and nontraded goods are not unvarying collections of commodities. There is never a definite group of commodities that can be exported. Changes in the structure of the economy or changes in profitability may widen or restrict the group of traded/exportable goods. Likewise, wholesale price indices (WPI) are also heavily weighted with traded goods. The use of consumer price indices (CPI) requires that the weighting pattern be the same for each country's price level, that is, taking a common basket of goods with a standard system of weighting. The PPP theory essentially refers to the internal value

---

[8] Alan C. Shapiro, "What Does Purchasing Power Parity Mean?" Journal of International Money and Finance, Vol. 2, No. 3 , December 1983; pp. 295-318.

of the currencies concerned, and variations in this value can be measured best by general index figures representing as far as possible the whole mass of commodities (and services), traded and nontraded, marketed in the country. This is reflected in a **GDP-based deflator** which is the price concept with a firm analytical foundation in PPP theory. In essence, a PPP measure based on a broad-based or general index is advocated since each country's own pattern of production provides the ideal source of weights to construct its price measure for PPP computation.[9]

IEC therefore uses the country's **domestic absorption deflator index** (relative to that of the US) in adjusting exchange rates for the few countries shown in Annex I.C. This is done as follows:

$$E_t = E_o * (DOMABS_{d,t}/DOMABS_{US,t})$$

where:

E_t = exchange rate (local currency per US$) at time t;

E_o = **IFS.RF** in base year "o";

$DOMABS_{d,t}$ = domestic absorption deflator at time t;

$DOMABS_{US,t}$ = US domestic absorption deflator at time t;

Table 5 compares the per capita GNP estimates using relative price-adjusted conversion factors and **IFS.RF** annual average

---

[9] See Lawrence H. Officer, "The Relationship Between Absolute and Relative Purchasing Power Parity," Review of Economics and Statistics, Vol. 60, November 1978, pp. 562-568

exchange rates for the five countries affected (Annex I.C). For Argentina and Bolivia, the practical implications are significant in the context of their eligibility for the Bank's lending programs.

Table 5: Price-adjusted and IFS.RF Exchange Rates in Per Capita Calculations: Change in Country Classification

	GNP per Capita (US$)			Change in Country Classification	
Country /1	Price-Adjusted Conversion Factor	IFS.RF	% Change	Operational /2	Analytical/Statistical
Argentina (1981)	1,960	4,460	127.6	III to Graduation	No change
Bolivia (1985)	430	850	97.7	II to III	No change
Ghana (1987)	390	430	10.3	No change	No change
Guinea-Bissau (1986)	160	200	25.0	No change	No change
Somalia (1989)	130	180	38.5	No change	No change

Source: BESD

/1 Referenced year of GNP per capita in parenthesis.
/2 Operational Lending Categories:
I Civil Works Preference
II IDA Eligibility and 20-Year IBRD Terms
III 17-Year IBRD Terms
IV IBRD Graduation

III. Mainframe (BESD) Footnotes

IEC has developed procedures and guidelines to incorporate 2-digit "pedigree" codes into the BESD system. It is presently testing these procedures and guidelines. While these procedures and guidelines for footnoting are still in the developmental stage, the BESD footnote will contain both country level and indicator level notes as well.

At the data-cell level, users of BESD will be alerted, and directed to view the detailed footnotes by a single cell-level

footnote indicator "F." These footnotes can then be viewed on the PC screen by the user. The facility to view country indicator and cell-level footnotes will be extended to users of ANDREX (Analysis, Derivation, and Reporting in Express -- an analytical tool of BESD). These footnotes can be extracted and downloaded from BESD and ANDREX into Lotus or Javelin files for viewing and updating.

A complementary but vital component of the BESD footnote system is the look-up tables. Look-up tables are meant to convert general statements in the footnote library into country-specific details which are not captured by the 2-digit coding system. Look-up tables for conversion factors are particularly suited to accommodate the country-specific notes on sources (e.g., whether primary, secondary, tertiary, and other exchange rates are from the IFS or from the Bank's Country Operation Departments), methodology, and the matrix of multiple rates and corresponding weights for those countries which maintain or have maintained dual or multiple exchange rates practices, and for which IEC has estimated trade-weighted conversion factors. Annex II shows prototype look-up tables on the specific country details regarding the estimation of the trade-weighted conversion factors that are expected to be available to users of BESD.

ANNEX 1

COUNTRY LISTING of BESD ("PEDIGREE") CODES for SOURCE and METHOD OF ATLAS GNP PER CAPITA CONVERSION FACTORS

BESD "EXCEPTIONAL" SOURCE CODES:/1

CA: COUNTRY OPERATIONS DIVISION

BESD METHOD CODES:

HA: TRADE WEIGHTED CONVERSION FACTOR
HB: CONVERSION FACTOR -- BASED ON RELATIVE PRICE ADJUSTMENTS
HZ: ADJUSTED CONVERSION FACTOR -- METHOD TO BE DOCUMENTED
TA: FISCAL YEAR ENDING JUNE 30
TB: FISCAL YEAR ENDING MARCH 31
TC: FISCAL YEAR ENDING SEPTEMBER 30
TD: FISCAL YEAR ENDING JULY 15
TE: FISCAL YEAR ENDING MARCH 20

COUNTRY	BESD CODE for SOURCE/METHOD /1	PERIOD
Djibouti		
Afghanistan		
Albania		
Algeria		
American samoa		
Angola		
Antigua and Barbuda		
Argentina	CA	1965-81
	HB	1965-81
Australia	TA	1960-90
Austria		
Bahamas		
Bahrain		
Bangladesh	TA	1960-90
Barbados		
Belgium		
Belize		
Benin		
Bermuda		
Bhutan		
Bolivia	CA	1974-85
	HB	1974-85
Botswana	TA	1960-90
Brazil		
Solomon islands		
Brunei		

/1 Footnotes refer to sources and methods only for conversion factors that are **NOT** the IFS.RF annual average exchange rates; for countries not footnoted, IEC uses the IFS.RF annual average exchange rates.

COUNTRY	BESD CODE for SOURCE/METHOD /1	PERIOD	
Bulgaria	CA	1987-90	
	HA	1987-90	
Myanmar	TC	1960-90	
Burundi			
Kampuchea			
Cameroon	TA	1960-90	
Canada			
Cape Verde			
Central African Rep.			
Chad			
Chile			
China			
Colombia			
Comoros			
Congo, People's Rep			
Costa Rica			
Cuba			
Cyprus			
Czechoslovakia	CA	1981-90	
	HA	1981-90	
Denmark			
Dominica			
Dominican Republic	CA	1982-84	
	HA	1982-84	
Ecuador	CA	1982-85	
	HA	1982-85	
Egypt, Arab Rep.	CA	1974-90	
	HA	1974-90	
El Salvador	CA	1982-86;	1989-90
	HA	1982-86;	1989-90
Equatorial Guinea			
Ethiopia			
Fiji			
Finland			
France			
French Polynesia			
Gabon			
Gambia, The	TA	1960-90	
Germany, Fed. Rep.			
Ghana	CA	1973-87	
	HB	1973-87	
Gibraltar			
Kiribati			
Greece			
Grenada			
Guadeloupe			
Greenland			

/1 Footnotes refer to sources and methods only for conversion factors that are NOT the IFS.RF annual average exchange rates; for countries not footnoted, IEC uses the IFS.RF annual average exchange rates.

COUNTRY	BESD CODE for SOURCE/METHOD /1	PERIOD
Guam		
Guatemala	CA	1985-86
	HA	1985-86
French Guiana		
Guinea		
Guinea-Bissau	CA	1970-86
	HB	1970-86
Guyana		
Haiti	TC	1960-90
Honduras	CA	1988-90
	HA	1988-90
Hong kong		
Hungary		
Iceland		
India	TB	1960-90
Indonesia		
Iran, Islamic Rep.of	TB	1960-90
	CA	1987-90
	HA	1987-90
Iraq		
Ireland		
Israel		
Italy		
Cote D'Ivoire		
Jamaica	CA	1981-83
	HA	1981-83
Japan		
Jordan		
Kenya		
Korea, Republic of		
Korea, Dem. Peop. Rep.		
Kuwait		
Lao, PDR		
Lebanon		
Lesotho		
Liberia		
Libyan Arab Republic		
Luxembourg		
Macao		
Madagascar		
Malawi		
Malaysia		
Maldives		
Mali		
Malta		
Martinique		
Mauritania		

/1 Footnotes refer to sources (and methods) only for conversion factors that are <u>exceptions to the expectation</u>; thus for countries not footnoted, IEC uses the IFS.RF annual average exchange rates.

COUNTRY	BESD CODE for SOURCE/METHOD /1	PERIOD	
Mauritius			
Mexico			
Mongolia			
Morocco			
Mozambique			
Namibia			
Nepal	TD	1960-90	
Netherlands, The			
Netherlands Antilles			
New Caledonia			
Vanuatu			
New Zealand	TB	1960-90	
Nicaragua	CA	1981-87	
	HA	1981-87	
Niger			
Nigeria	TB	1960-79	
Norway			
Oman			
Pacific Isl. Trust Territory			
Pakistan	TA	1960-90	
Panama			
Papua New Guinea			
Paraguay	CA	1982-89	
	HA	1982-89	
Peru	CA	1985-90	
	HA	1985-90	
Philippines			
Poland			
Portugal			
Timor			
Puerto Rico			
Qatar			
Reunion			
Zimbabwe			
Romania	CA	1987-90	1987-90
	HA	1987-90	
Rwanda			
St. Kitts and Nevis			
St. Lucia			
St. Vincent Grenadine			
Sao Tome and Principe			
Saudi Arabia			
Senegal			
Seychelles			
Sierra Leone	TA	1960-90	
Singapore			

/1 **Footnotes refer to sources and methods only for conversion factors that are NOT the IFS.RF annual average exchange rates; for countries not footnoted, IEC uses the IFS.RF annual average exchange rates.**

COUNTRY	BESD CODE for SOURCE/METHOD /1	PERIOD
Somalia	CA	1969-89
	HB	1969-89
South Africa		
Spain		
Sri Lanka		
Sudan	TA	1960-90
	CA	1981-90
	HA	1981-90
Suriname	CA	1989-90
	HA	1989-90
Swaziland		
Sweden		
Switzerland		
Syrian Arab Republic	CA	1981-90
	HA	1981-90
Thailand		
Togo		
Tonga	TA	1960-90
Trinidad and Tobago		
Tunisia		
Turkey		
Uganda	CA	
	HA	
United Arab Emirates		
United Kingdom		
Tanzania		
United States		
Virgin Islands (U.S.)		
Burkina Faso		
Uruguay		
Venezuela		
Viet Nam		
Western Samoa		
Yemen Arab Republic		
Yemen, PDR		
Yugoslavia		
Zaire		
Zambia	CA	1990
	HA	1990

/1 Footnotes refer to sources and methods only for conversion factors that are NOT the IFS.RF annual average exchange rates; for countries not footnoted, IEC uses the IFS.RF annual average exchange rates.

ANNEX I.A

COUNTRIES USING FISCAL YEAR CONVERSION FACTORS

NOTES:

Fiscal Year (FY) average exchange rates are derived by recasting IFS.RF quarterly exchange rates to conform with the national accounts FY time-frame, i.e., the four quarterly exchange rates corresponding to the country-specific FY from the IFS.RF are added together and an unweighted average FY exchange is derived.

Method Codes:

TA: FISCAL YEAR ENDING JUNE 30
TB: FISCAL YEAR ENDING MARCH 31
TC: FISCAL YEAR ENDING SEPTEMBER 30
TD: FISCAL YEAR ENDING JULY 15
TE: FISCAL YEAR ENDING MARCH 20

COUNTRY	BESD CODE for SOURCE/METHOD	PERIOD
1.Australia	TA	1960-90
2.Bangladesh	TA	1972-90
3.Botswana	TA	1960-90
4.Cameroon	TA	1960-90
5.Gambia	TA	1960-90
6.Haiti	TC	1960-90
7.India	TB	1960-90
8.Iran	TE	1960-90
9.Myanmar	TB	1960-90
10.Nepal	TD	1960-90
11.New Zealand	TB	1960-90
12.Nigeria	TB	1960-79
13.Pakistan	TA	1960-90
14.Sierra Leone	TA	1960-90
15.Sudan	TA	1960-90
16.Tonga	TA	1960-90

ANNEX I.B

COUNTRIES USING TRADE WEIGHTED "COMPOSITE" CONVERSION FACTORS

NOTES:

The existence of a multiple exchange rate system indicates that the IFS.RF annual exchange rate is not an appropriate conversion factor. A trade-weighted composite average of officially recognised exchange rates is estimated from a matrix of relevant exchange rates and corresponding weights. The weights are derived from the shares in total external transactions effected at the respective rates. These multiple rates and weights are from the Country Operations Divisions

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + \ldots + (R_{n,t} * W_{n,t})]$$

where:

E = trade-weighted composite conversion factor
R_i = multiple rates, 1, 2, 3, ... n
Wi = corresponding weights 1, 2, 3, ... n
t = year

Source Code:

CA: World Bank -- Country Operations Division

Method Code:

HA: Trade-weighted (Composite) Conversion Factor

		BESD Codes		
	Country	Source	Method	Period
1.	Bulgaria	CA	HA	1981-90
2.	Czechoslovakia	CA	HA	1981-90
3.	Dominican Rep	CA	HA	1982-84
4.	Ecuador	CA	HA	1982-85
5.	Egypt	CA	HA	1980-90
6.	El Salvador	CA	HA	1982-86; 1989-90
7.	Guatemala	CA	HA	1985-86
8.	Honduras	CA	HA	1988-90
9.	Iran	CA	HA	1987-90
10.	Jamaica	CA	HA	1981-83
11.	Nicaragua	CA	HA	1981-87
12.	Paraguay	CA	HA	1982-89
13.	Peru	CA	HA	1985-90
14.	Romania	CA	HA	1988-90
15.	Sudan	CA	HA	1988-89
16.	Suriname	CA	HA	1989-90
17.	Syria	CA	HA	1981-90
18.	Uganda	CA	HA	1969-83
19.	Zambia	CA	HA	1990

ANNEX I.C

COUNTRIES USING ADJUSTED CONVERSION FACTORS BASED ON DOMESTIC ABSORPTION DEFLATOR ADJUSTMENTS.

NOTES:

Such cases reflect situations where the relationship between domestic and foreign prices is so out of line as to distort the evolution of real exchange rates over time. The conversion factor is estimated by adopting a recent period where the IFS.RF exchange rate is considered as "realistic"; this IFS.RF annual average exchange rate is extrapolated forward using the relative (to US) Domestic Absorption Deflator.

$$E_t = E_o * (DOMABS_{d,t}/DOMABS_{US,t})$$

where:

E_t = exchange rate (local currency per US$) at time t;

E_o = IFS.RF in base year "o";

$DOMABS_{d,t}$ = domestic absorption deflator at time t;

$DOMABS_{US,t}$ = US domestic absorption deflator at time t;

SOURCE CODE:

CA: World Bank -- Country Operations Division

METHOD CODE:

HB: Conversion Factor based on Relative Price Adjustments

BESD Codes

	Country	Source	Method	Period
1.	Argentina (1982)	CA	HB	1972-81
2.	Bolivia (1973)	CA	HB	1974-85
3.	Ghana (1972)	CA	HB	1973-87
4.	Guinea-Bissau (1976)	CA	HB	1970-86
5.	Somalia ( )	CA	HB	1977-89

Relevant base year in parenthesis

ANNEX II

LOOK-UP TABLES WITH COUNTRY-SPECIFIC NOTES ON SOURCES AND METHODOLOGY FOR COUNTRIES WITH TRADE-WEIGHTED COMPOSITE CONVERSION FACTORS

BULGARIA:Trade-Weighted Composite Conversion Factors

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Rates										
Principal rate /1	1.04	1.09	1.10	1.00	1.19	1.42	1.30	1.67	1.82	2.11
Secondary rate /2					1.86	1.7	1.28	1.67	1.82	
Weights										
Principal rate	1	1	1	1	1	1	1	1	1	1
Secondary rate										
Trade-weighted rate /3	1.04	1.09	1.10	1.00	1.19	1.42	1.30	1.67	1.82	2.11

Sources: Rates: 1981-90: Country Operations Division (EM5); July 1991

Weights:1981-90: Full weight assigned to the commercial (principal) rate

/1 Commercial rate
/2 Noncommercial rate
/3 Atlas conversion factor, derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

CZECHOSLOVAKIA: Trade-Weighted Composite Conversion Factors

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Rates										
Principal rate /1	13.2492	13.7125	14.1625	16.6067	17.1400	14.9900	13.6858	14.3633	15.0542	17.9533
Secondary rate /2										31.4325
Weights										
Principal rate	1	1	1	1	1	1	1	1	1	1
Secondary rate										
Trade-weighted rate /3	13.2492	13.7125	14.1625	16.6067	17.1400	14.9900	13.6858	14.3633	15.0542	17.9533

Sources: Rates: 1981-90: IMF, International Financial Statistics

Weights: 1981-90: Full weight assigned to the commercial (principal) rate

/1 IFS.RF -- Commercial rate
/2 IFS.XF -- Noncommercial rate
/3 Atlas conversion factor, derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

DOMINICAN REPUBLIC: Trade-Weighted Composite Conversion Factors

	1982	1983	1984
Rates			
Principal rate /1	1.0000	1.0000	1.0000
Secondary rate /2	1.4571	N.A.	2.7373
Weights/3			
Principal rate	0.8033		0.3899
Secondary rate	0.1967		0.6101
Trade-weighted rate /4	1.0900	1.2600	2.0600

Sources: Rates: 1982-84: Principal and secondary rate from IMF International Financial Statistics
Trade-weighted rate from Country Operations Department

Weights: 1982-84: Derived by IECSE; see /3

/1 IFS.RF -- Official rate
/2 IFS.XF -- Parallel market rate
/3 Weights are derived from following relationship:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * (1 - W_{1,t}))]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

/4 Atlas conversion factor: Trade-weighted conversion factor provided by Country Operation Department

ECUADOR: Trade-Weighted Composite Conversion Factors

	1982	1983	1984	1985
Rates				
Principal rate /1	30.0258	44.115	62.5359	69.5562
Secondary rate /2				
Weights /2				
Principal rate				
Secondary rate				
Trade-weighted rate /3	33.3999	52.8999	79.5000	91.5000

Sources: Rates: 1982-85: Principal rate from IMF, International Financial Statistics
Trade-weighted rates from Country Operations Department

Weights: 1982-85: Not available separately

/1 IFS.RF -- Official rate
/2 Not separately available
/3 Atlas conversion factor: Trade-weighted conversion factor provided by Country Operation Department

EGYPT: Trade-Weighted Composite Conversion Factors

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Rates										
Principal /1	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	1.1000
Secondary /2	0.7390	0.8317	0.8317	0.8317	1.3010	1.3503	1.5183	2.2233	2.5171	2.7072
Tertiary rate /3	1.0100	1.1300	1.1453	1.2543	1.5488	1.8838	2.1459	2.3731	2.6949	2.7978
Weights										
Principal rate					0.4350	0.4150	0.3690	0.3032	0.2669	0.2397
Secondary rate					0.1400	0.1830	0.2370	0.6968	0.7331	0.7603
Tertiary rate					0.4250	0.4020	0.3940	0	0	0
Trade-weighted rate /4	0.7898	0.8490	0.8940	0.7540	1.1449	1.2949	1.4596	1.76122	1.9368	2.2290

Source: Rates: 1980-84: IMF, International Finance Statistics
1985-90: Bank's Country Operations Division

Weights: 1980-84: Corresponding weights not separately available
1985-90: Bank's Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 Central Bank rate
/2 Parallel rate (1981-87)
Commercial-parallel rate (1988-90)
/3 "Outside-bank" rate (1981-87)
/4 Atlas conversion factor: derived as

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

EL SALVADOR: Trade-Weighted Composite Conversion Factors

	1982	1983	1984	1985	1986	1987	1988	1989	1990
Rates									
Principal /1	..5	2.5	2.5	2.5	5.8522	5.0	5.0	5.0	6.8483
Secondary /2									
Tertiary /2									
Weights /2									
Principal rate									
Secondary rate									
Tertiary rate									
Trade-weighted rate /3	2.57	2.73	2.82	3.67	5.00	5.0	5.0	5.60	7.60

Source: Rates: 1982-86; 1989-90: Principal rate from IMF, **International Financial Statistics**
Other rates not separately available

Weights: 1982-86; 1989-90: Not separately available

/1 IFS.RF -- Official exchange rate
/2 Not separately available
/3 Atlas conversion factor: these are trade-weighted exchange rates that have effectively taken into account various exchange rates and weights. Country Operations Division is unable to provide details of the separate rates and weights.

GUATEMALA: Trade-Weighted Composite Conversion Factors

	1985	1986
Rates		
Principal rate /1	1.0000	1.8750
Secondary rate /2	2.7700	1.8000
Tertiary rate /3	2.6500	2.5700
Weights/4		
Principal rate		
Secondary rate		
Trade-weighted rate /5	1.1500	2.1900

Sources: Rates: 1985-86: Principal, secondary, and tertiary rates from IMF, International Financial Statistics
Trade-weighted rate from Country Operations Division

Weights: 1985-86: Not separately available.

/1 IFS.RF -- Official rate
/2 IFS.XF -- Parallel market rate
/3 IFS.YF -- auction market rate
/4 Separate weights not available
/5 Atlas conversion factor: trade-weighted conversion factor provided by Country Operations Department

HONDURAS: Trade-Weighted Composite Conversion Factors

	1988	1989	1990
Rates			
Principal rate /1	2.0000	2.0000	2.0000
Secondary rate /2	2.9100	3.6100	4.5200
Weights			
Principal rate	0.640	0.400	0.110
Secondary rate	0.360	0.600	0.890
Trade-weighted rate /3	2.3280	2.9660	4.2430

Sources: Rates: 1988-90: Country Operations Division (August 1991)

Weights: 1988-90: Bank's Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 Official rate
/2 Parallel market rate
/3 Atlas conversion factor; derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

IRAN: Trade-Weighted Composite Conversion Factors

	1987	1988	1989	1990
Rates/1				
Principal rate /2	71.4602	68.6832	72.0148	66.8560
Secondary rate /3				420.0000
Tertiary rate /4				800.0000
Other rate 1 /5				1300.0000
Other rate 2 /6				700.0000
Other rate 3 /7				
Other rate 4 /8				1300.0000
Weights /1				
Principal rate				0.6795
Secondary rate				0.0899
Tertiary rate				0.1210
Other rate 1				0.0145
Other rate 2				0.0302
Other rate 3				0
Other rate 4				0.0649
Trade-weighted rate /9	144.9100	177.9700	215.9999	304.3467

Sources: Rates: 1987-90: Principal rate from IFS.RF;
1990: Other rates from Country Operations Division (June 1991)

Weights: 1990: Bank's Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 Rates and corresponding weights for 1987-89 are not separately for 1987-89
/2 IFS.RF -- Official rate
/3 Preferential rate
/4 Competitive rate
/5 Intervention rate
/6 Surrender rate
/7 Non-oil export rate
/8 Free market rate
/9 Atlas conversion factor: derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

/9 Rates and weights are not separately available.

JAMAICA: Trade-Weighted Composite Conversion Factors

	1981	1982	1983
Rates			
Principal /1	1.7814	1.7814	1.9322
Secondary			
Weights			
Principal rate			
Secondary rate			
Trade-weighted rate /2	1.9300	1.9900	2.1500

Sources: Rates: 1981-83: Principal rate from IMF, International Financial Statistics
Other rates not separately available

Weights: 1981-83: Not separately available

/1 IFS.RF -- Official rate
/2 Atlas conversion factor: trade-weighted conversion factor provided by Country Operations Department.

NICARAGUA: Trade-Weighted Composite Conversion Factors

	1986	1987
Rates		
Principal /1	0.0975	0.1026
Secondary /2		
Weights /2		
Principal rate		
Secondary rate		
Trade-weighted rate /3	0.0159	0.7865

Source: Rates: 1986-87: Principal rate from IMF, International Financial Statistics
Trade-weighted rate from Bank's Country Operations Division

Weights: 1986-87: Not separately available

/1 IFS.RF -- Official exchange rate
/2 Not separately available
/3 Atlas conversion factor: derived as

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

PARAGUAY: Trade-Weighted Composite Conversion Factors

	1982	1983	1984	1985	1986	1987	1988	1989
Rates								
Principal /1	126.0	126.0	201.0	306.67	339.17	550.0	550.0	1056.22
Secondary /2	160.5	160.0	321.85	602.8	700.3			
Tertiary /3		315.17	224.3	226.7	253.3	400.0	400.0	
Weights /4								
Principal rate								
Secondary rate								
Trade-weighted rate /5	136.0	146.0	243.70	440.70	517.40	668.0	840.0	1120.0

Sources: Rates: 1982-89: Principal, secondary, and tertiary rates from IMF, International Financial Statistics
Trade-weighted rate from Country Operations Department

Weights: 1982-89: Not available

/1 IFS.RF -- Official rate
/2 IFS.XF -- Parallel market rate
/3 IFS.YF -- secondary fixed official rate
/4 Separate weights not available
/5 Atlas conversion factor: Trade-weighted conversion factor provided by Country Operation Department

PERU: Trade-Weighted Composite Conversion Factors

	1985	1986	1987	1988	1989	1990
Rates						
Principal /1	11.2267	13.9500	17.5875	147.0000	2,837.0000	197,635.1
Secondary /2	12.8583	17.8742	42.1508	381.9082	4,772.8910	220,870.2
Weights						
Principal rate	0.7072	0.6143	0.6176	0.5520	0.3879	0.4705
Secondary rate	0.2928	0.3857	0.3824	0.4480	0.6121	0.5295
Trade-weighted rate /3	11.7044	15.4636	26.9805	252.2389	4,022.227	209,938.1

Sources: Rates: 1985-90: Bank's Country Operations Division

Weights: 1985-90: Bank's Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 Official rate
/2 Free market rate
/3 Atlas conversion factor: derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

SUDAN: Trade-Weighted Composite Conversion Factors

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Rates										
Principal /1	0.6301	1.0268	1.1783	1.3800	1.2461	1.1200	1.6039	4.1701	6.3001	12.2009
Secondary /2	0.6301	0.8488	1.3034	1.3370	1.6351	1.8217	1.8543	4.1698	6.2974	12.2000
Weights										
Principal rate	0.2972	0.2797	0.3152	0.3541	0.3647	0.3442	0.3826	0.3122	0.3248	0.3392
Secondary rate	0.7028	0.7203	0.6848	0.6459	0.6353	0.6558	0.6174	0.6878	0.6752	0.6608
Trade-weighted rate /3	0.6301	0.8986	1.2639	1.3522	1.4933	1.5802	1.7585	45.1699	6.2983	12.2203

Source: Rates: 1981-90: Bank's Country Operations Division

Weights: 1981-90: Bank's Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 Implicit export rate - derived from exports GNFS in national accounts (local currency and BoP in $US.

/2 Implicit import rate - derived from imports GNFS in national accounts (local currency and BoP in $US.

/3 Atlas conversion factor: derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

SURINAME: Trade-Weighted Composite Conversion Factors

	1989	1990
Rates		
Principal rate /1	1.7850	1.7850
Secondary rate /2	5.0000	5.0000
Weights		
Principal rate	0.9656	0.9656
Secondary rate	0.0344	0.0344
Trade-weighted rate /3	1.8956	1.8956

Sources: **Rates: 1989-90:** Principal rate from IMF, International Financial Statistics
Secondary from Country Operations Division (August 1991)

Weights:1989-90: Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 IFS.RF -- Official rate
/2 "Dutch development aid" import rate
/3 Atlas conversion factor: derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

SYRIA: Trade-Weighted Composite Conversion Factors

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Rates										
Principal /1	3.925	3.925	3.925	3.925	3.925	3.925	3.925	11.225	11.225	11.225
Secondary /2	5.5586	5.425	5.425	5.425	5.425	5.425	5.425			
Tertiary rate /3	6.0265	5.8878	5.8853	7.915	11.8297	19.160	30.400	38.630	42.000	42.000
Other rate 1 /4		5.7846	5.6500	6.8623	8.5146	9.6092	9.6092			
Other rate 2 /5						21.470	25.510	24.200	22.000	22.000
Other rate 3 /6									40.000	40.000
Other rate 4 /7							11.225			
Other rate 5 /8								18.000		
Weights										
Principal rate	0.8266	0.8218	0.8564	0.8754	0.8305	0.7112	0.4636	0.7520	0.7280	0.7524
Secondary rate	0.1078	0.1148	0.0753	0.0417	0.0216	0.0117	0.0029	0	0	0
Tertiary rate	0.0655	0.0501	0.0466	0.0697	0.1319	0.1892	0.1696	0.2240	0.2340	0.2276
Other rate 1	0	0.0134	0.0217	0.0133	0.0160	0.0717	0.0506	0	0	0
Other rate 2	0	0	0	0	0	0.0163	0.0179	0.0101	0.0280	0.0100
Other rate 3	0	0	0	0	0	0	0	0	0	0.0100
Other rate 4	0	0	0	0	0	0	0.2956	0	0	0
Other rate 5	0	0	0	0	0	0	0	0	0	0
Trade-weighted rate /9	4.2387	4.2204	4.1668	4.3045	5.0736	7.5175	11.246	17.5897	19.0169	18.6237

Source: Rates: 1981-90: Bank's Country Operations Division

Weights: 1981-90: Bank's Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 Official rate
/2 Parallel rate
/3 "Unofficial rate"
/4 Tourist rate
/5 Promotion rate
/6 Promotion rate (export)
/7 Devalued official rate (end 1987)
/8 Airline rate
/9 Atlas conversion factor: derived as:

$$E_t = [(R_{1,t}{}^{a}W_{1,t}) + (R_{2,t}{}^{a}W_{2,t}) + .. + (R_{n,t}{}^{a}W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

UGANDA: Trade-Weighted Composite Conversion Factors

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Rates										
Principal /1	0.5005	0.9605	1.5386	3.597	6.7202	14.0	62.8413	106.136	223.092	428.835
Secondary /2										
Tertiary rate /2										
Weights /2										
Principal rate										
Secondary rate										
Tertiary rate										
Trade-weighted rate /3	2.0	2.0	3.0	4.0	11.0	16.0	51.0	127.0	331.0	496.0

Source: Rates: 1981-90: Principal rate from IMF, International Financial Statistics
Other rates not separately available
Trade-weighted rate from Bank's Country Operations Division

Weights: 1981-90:

/1 IFS.RF -- Official rate
/2 Not separately available
/3 Atlas conversion factor: trade-weighted conversion factor provided by Country Operations Department

ZAMBIA: Trade-Weighted Composite Conversion Factors

	1990
Rates	
Principal rate /1	30.2890
Secondary rate /2	47.0000
Weights	
Principal rate	0.7500
Secondary rate	0.2500
Trade-weighted rate /3	34.4668

Sources: Rates: 1990: Country Operations Division (August 1991)

Weights: 1990: Country Operations Division
Derived from data on exports and imports effected at respective rates.

/1 Official rate
/2 Market exchange rate
/3 Atlas conversion factor: derived as:

$$E_t = [(R_{1,t} * W_{1,t}) + (R_{2,t} * W_{2,t}) + .. + (R_{n,t} * W_{n,t})]$$

where: E = Trade-weighted composite conversion factor
R_i = Multiple rates, 1, 2,..... n
W_i = Corresponding weights, 1, 2, 3, ... n
t = year

BIBLIOGRAPHY

Hee, Michael, **Conversion Factors: A Discussion of Alternate Rates and Corresponding Weights,** PRE Working Paper WPS 479 (World Bank, August 1990).

International Monetary Fund, **International Financial Statistics** (Washington DC: International Monetary Fund, various issues).

_____, **Annual Report on Exchange Arrangements and Exchange Restrictions** (Washington, DC: International Monetary Fund, 1989).

_____, **Exchange Arrangements and Exchange Controls**, (Washington, DC: International Monetary Fund, 1989).

_____, "Developments in International Exchange and Trade Systems," **World Economic and Financial Surveys** (Washington, DC: International Monetary Fund, September 1989).

_____, "Review of Experience with Multiple Exchange Rate Regimes", (SM/84/64), Unpublished (March 19, 1984).

_____, "Review of Multiple Exchange Rate Regimes - Background Information", (SM/84/65), Unpublished (March 20, 1984).

_____, "Multiple Currency Practices Applicable Solely to Capital Transactions", (SM/85/19), Unpublished (January 19, 1985).

Officer, Lawrence H., **Purchasing Power Parity and Exchange Rates: Theory, Evidence and Relevance** (Greenwich, Connecticut: Jai Press Inc. 1982)

Shapiro, Alan C., "What Does Purchasing Power Parity Mean?" **Journal of Money and Finance**, Vol. 2, No. 3, December 1983; pp. 295-315.

World Bank, **Per Capita Income -- Estimating Internationally Comparable Numbers** (International Economics Department, World Bank, January 13, 1989).

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS934	Public Hospital Costs and Quality in the Dominican Republic	Maureen A. Lewis Margaret B. Sulvetta Gerard M. LaForgia	July 1992	P. Trapani 31947
WPS935	The Precautionary Demand for Commodity Stocks	Boum-Jong Choe	July 1992	S. Lipscomb 33718
WPS936	Taxation, Information Asymmetries, and a Firm's Financing Choices	Andrew Lyon	July 1992	C. Jones 37699
WPS937	How Soft is the Budget Constraint for Yugoslav Firms?	Evan Kraft Milan Vodopivec	July 1992	CECSE 37178
WPS938	Health, Government, and the Poor: The Case for the Private Sector	Nancy Birdsall Estelle James	July 1992	S. Rothschild 37460
WPS939	How Macroeconomic Policies Affect Project Performance in the Social Sectors	Daniel Kaufmann Yan Wang	July 1992	D. Kaufmann 37305
WPS940	Private Sector Approaches to Effective Family Planning	Karen G. Foreit	August 1992	O. Nadora 31091
WPS941	Projecting the Demographic Impact of AIDS	Rodolfo A. Bulatao Eduard Bos	August 1992	O. Nadora 31091
WPS942	Efficient Environmental Regulation: Case Studies of Urban Air Pollution (Los Angeles, Mexico City, Cubatao, and Ankara)	Arik Levinson Sudhir Shetty	August 1992	WDR 31393
WPS943	Burden-sharing among Official and Private Creditors	Asli Demirgüç-Kunt Eduardo Fernández-Arias	August 1992	K. Waelti 37664
WPS944	How Public Sector Pay and Employment Affect Labor Markets: Research Issues	Gail Stevenson	August 1992	PHREE 33680
WPS945	Managing the Civil Service: What LDCs Can Learn from Developed Country Reforms	Barbara Nunberg	August 1992	P. Infante 37642
WPS946	Retraining Displaced Workers: What Can Developing Countries Learn from OECD Nations?	Duane E. Leigh	August 1992	PHREE 33680
WPS947	Strategies for Creating Transitional Jobs during Structural Adjustment	Stephen L. Mangum Garth L. Mangum Janine Bowen	August 1992	PHREE 33680

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS948	Factors Affecting Private Financial Flows to Eastern Europe, 1989-91	Mohua Mukherjee	July 1992	R. Lynn 32169
WPS949	The Impact of Formal Finance on the Rural Economy of India	Hans Binswanger Shahidur Khandker	August 1992	H. Binswanger 31871
WPS950	Service: The New Focus in International Manufacturing and Trade	Hans Jürgen Peters	August 1992	A. Elcock 33743
WPS951	Piecemeal Trade Reform in Partially Liberalized Economies: An Evaluation for Turkey	Glenn W. Harrison Thomas F. Rutherford David G. Tarr	August 1992	D. Ballantyne 38004
WPS952	Unit Costs, Cost-Effectiveness, and Financing of Nutrition Interventions	Susan Horton	August 1992	O. Nadora 31091
WPS953	The "Pedigree" of IEC Conversion Factors for Per Capita GNP Computations for the World Bank's Operational Guidelines and *Atlas*	Michael Hee	August 1992	E. Zamora 33706